Title

Method of Guiding Plant Stem and Branch Growth

Background of the Present Invention

Field of Invention

The present invention relates to an apparatus for guiding a growing plant, and more particularly to a guiding device and a guiding method thereof, wherein the guiding device is adapted for not only selectively adjusting a loop size to fit the diameter of the growing plant but also detaching from the growing plant while the guider device can be reused to bind up the growing plant due to the change of the diameter of the growing plant.

Description of Related Arts

For instance, the most notorious guiding device application is of gardening practice, especially in vineyard or orchard. To seek richer productivity, young growth plants would be bound with wood frames or standing rods to keep corrected extending direction. Meanwhile, some fruitful trees, which occupy large area, need to be bound for gust resistance. Therefore, gardeners usually twist the fastener to form a loop boundary around the plant with supporting frames such as wood or rods by ropes, metal wires, or the like.

If a metal wire is used to tight up the plant with the supporting frame, the metal wire may get rusted due to the corrosion after a period of time. In addition, if the metal wire is tightly bound with the plant, the outer skin of the plant will be damaged, especially when the plant is growing to increase its diameter. Therefore, an additional rod is bound on the outer skin of the plant within the loop of the metal wire to prevent the metal wire directly contacting with the outer skin of the plant, as shown in Fig. 1.

Furthermore, the user may merely cut the metal wire and re-bind the plant with another new metal wire. It is worth to mention that the binding operation of the metal

wire is simple by twisting the metal wire around the plant. However, the unbinding operation of the metal will be hassle that the user must cut the metal wire from the plant while the metal wire is tightly bound with the plant. Especially when the user cuts the rusted metal wire, he or she may merely wear a glove to prevent the hand of the user from being cut by the metal wire during the unbinding operation thereof.

If ropes or strings were fastened in detachable knots, the tight tension could not be guaranteed. Instead, if the dead knots were applied, gardeners would have to cut the ropes or strings to break the knots first, and then bind the plants again with new ropes. This procedure is time consuming and raw materials wasting. What is more, if the strings were made of metal materials, unbinding process would be rather frustrating. On the other hand, the gardeners would have to carry plenty of new fastening devices to replace the old ones. It is hard to imagine that one gardener would bind all plants in an orchard of more than thousands of peach trees.

In addition, the diameters of plants, especially of those seedlings or young growth trees, changed from year to year. If the ropes or fasteners were too tight, the nutrition passage of plants would be restricted thus causing plants wither and yellow, even to the extent death. Therefore, gardeners have to adjust the fasteners' loop diameters from season to season. Here, it could be seen that traditional fastening devices have huge drawbacks.

In brief, detaching and adjusting fasteners have been a perplexing problem for our lives. A kind of fasteners has detachable and adjustable function is highly desirable.

Summary of the Present Invention

A main object of the present invention is to provide a guiding device, wherein the guiding device is adapted for not only selectively adjusting a loop size to fit the diameter of the growing plant but also detaching from the growing plant while the guiding device can be reused to bind up the growing plant due to the change of the diameter of the growing plant.

Another object of the present invention is to provide a guiding device, which comprises a plurality of locking teeth spacedly provided at a tail portion of an elongated guiding member and a locker slot integrally provide at a head portion of the elongated guiding member to detachably engage with one of the locking teeth to form a binding loop for binding at the growing plant.

Another object of the present invention is to provide a guiding device, wherein the binding operation of the guiding device is quick and easy that by simply inserting the tail portion of the guiding member into the locker slot and twisting the tail portion of the guiding member to lock up one of the locking teeth at the locker slot. In other words, the detaching operation of the guiding device is rapid by twisting the tail portion of the guiding member to release the locking engagement of the locking teeth and ejecting the tail portion of the guiding member from the locker slot.

Another object of the present invention is to provide a guiding device, wherein the locker slot is shaped and sized corresponding to the locking teeth to securely engage with one of the locking holders in a detachably attaching manner such that the guiding member can be reused to adjust the binding loop thereof for fitting the diameter of the growing plant. In other words, the user is able to keep the guiding device to bind the growing plant even the diameter of the growing plant has changed.

Another object of the present invention is to provide a guiding device, wherein no expensive or complicated structure is required to employ in the present invention in order to achieve the above mentioned objects. Therefore, the present invention successfully provides an economic and efficient solution not only for adjusting the loop size of the guiding device to fit the growing plant but also for reusing the guiding device due to the change of the diameter of the growing plant so as to facilitate the practical use of the guiding device.

Accordingly, in order to accomplish the above objects, the present invention provides a method for guiding a growing plant, comprising the steps of:

(a) providing a guiding device, wherein the guiding device comprises an elongated guiding member, a plurality of locking teeth evenly formed along a longitudinal edge of the guiding member and a locker slot longitudinal formed on a head portion of the guiding member;

(b) twisting the tail portion of the guiding member to substantially align with a longitudinal length of the locker slot;

(c) slidably inserting the tail portion of the guiding member through the locker slot to form a binding loop;

(d) adjustably sliding the tail portion of the guiding member along the locker slot to adjust a loop diameter of the binding loop corresponding with a diameter of the growing plant; and

(e) twisting the tail portion of the guiding member back to its original orientation such that a holding neck portion of the corresponding locking tooth is locked at the locker slot so as to retain the loop diameter of the binding loop to fittingly bind up the growing plant.

These and other objectives, features, and advantages of the present invention will become apparent from the following detailed description, the accompanying drawings, and the appended claims.

Brief Description of the Drawings

Fig. 1 is a perspective view of a conventional guiding device for guiding a growing plant.

Fig. 2 is a perspective view of a guiding device for guiding a growing plant with a supporter according to a preferred embodiment of the present invention.

Fig. 3 is a perspective view of the guiding device according to the above preferred embodiment of the present invention, illustrating a tail portion of the guiding member being twisted to align with a longitudinal length of the locker slot.

Fig. 4 is a perspective view of the guiding device to the growing plant according to the above preferred embodiment of the present invention, illustrating the guiding member forming a binding loop to bind up the branch of glowing plant with the supporter

Figs. 5A and 5B illustrate the applications of the guiding device for guiding the stem of growing plant with the supporter according to the above preferred embodiment of the present invention.

Fig. 6 illustrates a first alternative mode of the guiding device according to the above preferred embodiment of the present invention.

Fig. 7 illustrates a second alternative mode of the guiding device according to the above preferred embodiment of the present invention.

Fig. 8 illustrates a third alternative mode of the guiding device according to the above preferred embodiment of the present invention.

Detailed Description of the Preferred Embodiment

Referring to Figs. 2 and 4 of the drawings, a guiding device for guiding a growing plant 1 via a supporter 2 and the method thereof according to a preferred embodiment of the present invention is illustrated, wherein the guiding device is adapted to selectively adjust a loop size thereof for fitting the size of the growing plant 1 and detachably bind to the growing plant 1 to guide the plant stem and branch growth.

According to the preferred embodiment, the method for guiding a growing plant 1 comprises the following steps.

(1) Provide a guiding member 10, as shown in Fig. 2, wherein a plurality of locking teeth 21 spacedly formed along a longitudinal edge of a tail portion 12 of the guiding member 10.

(2) Twist a tail portion 12 of the guiding member 10 to substantially align with a longitudinal length L of a locker slot 31, as shown in Fig. 3.

(3) Slidably insert the tail portion 12 of the guiding member 10 through the locker slot 31 to form a binding loop 101, wherein the tail portion 12 of the guiding member 10 is slid along the locker slot 31 to adjust a loop diameter of the binding loop 101 corresponding with a distance between the growing plant 1 and the supporter 2.

(4) Twist the tail portion 12 of the guiding member 10 back to its original orientation such that the holding neck portion 22 of the corresponding locking tooth 21 is locked at the locker slot 31 so as to retain the loop diameter of the binding loop 101 to fittingly bind the growing plant 1 with the supporter 2, as shown in Fig. 4.

According to the preferred embodiment, the guiding member 10 of the guiding device has a head end, an opposed tail end, a head portion 11 defining at the head end, wherein the tail portion 12 is defined at the tail end of the guiding member 10. Accordingly, the guiding member 10 is an elongated member having a length substantially long enough to form the binding loop 101 to bind the growing plant 1 with the supporter 2.

The guiding member 10 is made of flexible and durable material, such as plastic, adapted to be bent to form the binding loop 101 in a circular shape. The guiding member 10 is embodied as an elongated plastic strip which can be manufactured by a conventional plastic molding technique to lower the manufacturing cost of the present invention. Preferably, the guiding member 10 is made of polyethylene such as LDPE, HDPE, LLPE, wherein 10% of EVA is optional mixed therewith.

As shown in Fig. 2, the locking teeth 21 are integrally and alignedly formed along the longitudinal edge of the tail portion 12 of the guiding member 10 to define a holding neck portion 22 on the guiding member 10 at a root portion of each of the locking teeth 21. The holding neck portion 22 of each of the locking teeth 21 has a width W_1 smaller than a width W_T of the guiding member 10, wherein the holding neck portion 22 of the respective locking tooth 21 is detachably engaged with the locker slot 31 to form the binding loop 101.

In other words, the guiding member 10 is bent between a matting position and a locking position. At the matting position, as shown in step (2), the tail portion 12 of the guiding member 10 is twisted to align to the longitudinal length L of the locker slot 31, such that the tail portion 12 of the guiding member 10 is allowed to slidably pass through the locker slot 31 so as to adjust the diameter of the binding loop 101. In addition, at the locking position, as shown in step (4), the tail portion 12 of the guiding member 10 is then twisted back to overlap on the head portion 11 thereof to lock up the holding neck portion 22 of the corresponding locking tooth 21 at the locker slot 31 to retain the diameter of the binding loop 101. Accordingly, the head portion 11 of the guiding member 10 is allowed to be detached from the tail portion 12 thereof when the head portion 11 of the guiding member 10 is moved to the matting position.

Each of the locking teeth 21 has a guiding edge 211 having an outer end 2111 formed at the longitudinal edge of the tail portion 12 of the guiding member 10 and an inner end 2112 inclinedly and inwardly extended on the guiding member 10 towards the tail end thereof to define the holding neck portion 22 on the guiding member 10 at the inner end 2112 of the guiding edge 211 of each of the locking teeth 21.

Each of the locking teeth 21 further has a locking edge 212 transversely and inwardly extended from the outer end 2111 of the guiding edge 211 to the inner end 2112

of the adjacent guiding edge 211 such that the locking teeth 21 are continuously extended along the longitudinal edge of the tail portion 12 of the guiding member 10.

It is worth to mention that the locking teeth 21 are integrally and alignedly formed along the two longitudinal edges of the tail portion 12 of the guiding member 10, as shown in Fig. 2, to enhance the locking ability of the locking holders 20.

The locker slot 31 is an elongated slot longitudinally formed on the head portion 11 of the guiding member 10 wherein the locker slot 31 has a longitudinal length L substantially larger than the width W_T of the guiding member 10 and a transverse width W which is larger than a thickness of the guiding member 10 and is larger than the width W_1 of the holding neck portion 22 of each of the locking teeth 21 in such a manner that when the tail portion 12 of the guiding member 10 is twisted to align to the longitudinal length L of the locker slot 31, the tail portion 12 of the guiding member 10 is allowed to slidably pass through the locker slot 31, as shown in Fig. 3, while the tail portion 12 of the guiding member 10 is then twisted back to overlap on the head portion 11 thereof to lock up the holding neck portion 22 of the corresponding locking tooth 21 at the locker slot 31 by the transverse width W thereof, so as to form the binding loop 101 of the guiding member 10, as shown in Fig. 4.

It is worth to mention that the guiding edge 211 of each of the locking teeth 21 is extended inclinedly at a direction corresponding to an inserting direction of the tail portion 12 of the guiding member 10 such that the locking teeth 21 are allowed to slide through the locker slot 31 at the inserting direction while the locking teeth 21 are blocked up at the transverse width W at an ejecting direction which is opposed to the inserting direction.

Therefore, while sliding the tail portion 12 of the guiding member 10 through the locker slot 31 at the inserting direction, the inclined guiding edges 211 of the locking teeth 21 guide the tail portion 12 of the guiding member 10 to slide through the locker slot 31 so as to prevent a tearing force applied at the tail portion 12 of the guiding member 10 which may tear off the locking teeth 21. In addition, when a pulling force applied on the guiding member 10 at the ejecting direction, the locking edge 212 of the respective locking tooth 21 is substantially biased against the head portion 11 of the guiding member 10 such that the pulling force can ensure the locking engagement between the locker slot 31 and the respective locking tooth 21, as shown in Fig. 4.

As shown in Fig. 4, when the holding neck portion 22 of the locking tooth 21 is locked at the locker slot 31 via the transverse width W thereof, the locking edge 212 of the respective locking tooth 21 biases against the head portion 11 of the guiding member 10 at the locker slot 31 so as to further securely lock up the tail portion 12 of the guiding member 10 with the head portion 11 thereof to retain the size of the binding loop 101.

As shown in Fig. 2, the locker slot 31 is formed as a triangular shape, wherein the locker slot 31 has a width gradually increasing towards the head end of the guiding member 10, so as to substantially guide the twisting movement of the tail portion 12 of the guiding member 10 within the locker slot 31. The locker slot 31 has a longitudinal length L substantially larger than the width W_T of the guiding member 10 and a transverse width W which is larger than a thickness of the guiding member 10 and is larger than the width W_1 of the holding neck portion 22 of each of the locking teeth 21.

Accordingly, the longitudinal length L of the locker slot 31 is defined along an adjacent edge thereof for the tail portion 12 of the guiding member 10 to slidably inserting therethrough. The locker slot 31 further has a longitudinal guiding width L_1 defining at a height of the locker slot 31 at least equal to the width W_T of the guiding member 10 so as to enhance the tail portion 12 of the guiding member 10 to slidably insert through the locker slot 31, as shown in Fig. 2.

The tail end of the guiding member 10 has a tapered shape having a width W_2 substantially smaller than the transverse width W of the locker slot 31 such that the tapered tail portion 12 of the guiding member 10 is guided to slide through the locker slot 31 when the tail end of the guiding member 10 is inserted therethrough. It is worth to mention that when the tapered tail end of the guiding member 10 is inserted through the locker slot 31, the user is able to pull the tail end of the guiding member 10 to guide the tail portion 12 thereof to slide through the locker slot 31.

In order to guide the branch of the growing plant 1 with the guiding device of the present invention, as shown in Fig. 4, the user is able to twist the tail portion 12 of the guiding member 10 to align with the longitudinal length L of the locker slot 31, such that the tail portion 12 of the guiding member 10 is allowed to slidably pass through the locker slot 31, as shown in step (2). Then, by applying a pulling force on the tail portion 12 of the guiding member 10 at the inserting direction, the tail portion 12 of the guiding

member 10 is slid through the locker slot 31 to form the binding loop 101, as shown in step (3).

Once the diameter of the binding loop 101 matches the distance between the growing plant 1 and the supporter 2, the tail portion 12 of the guiding member 10 is then twisted back to its original orientation such that the holding neck portion 22 of the corresponding locking tooth 21 is locked at the locker slot 31 so as to retain the diameter of the binding loop 101 to tightly bind up the growing plant 1 with the supporter 2, as shown in Fig. (4). Therefore, the size of the binding loop 101 can be selectively adjusted via the engagement between the locker slot 31 and one of the locking teeth 21 so as to fittingly tight up the growing plant 1 with the supporter 2.

In order to detach the adjustable and detachable guiding device from the growing plant 1, the user is able to twist the tail portion 12 of the guiding member 10 to align with the longitudinal length L of the locker slot 31 so as to release the engagement between the locker slot 31 and the corresponding locking tooth 21. Therefore, the tail portion 12 of the guiding member 10 is adapted to slide out from the locker slot 31 to detach the guiding member 10 from the growing plant 1.

According to the preferred embodiment, the method for guiding the growing plant 1 further comprises the following steps.

(5) When the growing plant 1 grows to increase the diameter to a grown diameter, release the guiding member 10 from the growing plant 1 by twisting the tail portion 12 of the guiding member 10 to align with the longitudinal length L of the locker slot 31 to unlock the respective locking tooth 21 with the locker slot 31 such that the tail portion 12 of the guiding member 10 is allowed to slidably eject from the locker slot 31.

(6) Slidably release the tail portion 12 of the guiding member 10 through the locker slot 31 such that the binding loop 101 of the guiding member 10 is adjusted for fitting the grown diameter of the growing plant 1 with respect to the supporter 2.

(7) Twist the tail portion 12 of the guiding member 10 back to its original orientation such that the holding neck portion 22 of the adjacent locking tooth 21 is locked at the locker slot 31 so as to retain the loop diameter of the binding loop 101 to fittingly re-bind the guiding member 10 around the growing plant 1 with the supporter 2.

Therefore, the guiding device of the present invention can be reused to re-bind the growing plant 1 with the supporter 2 by repeating the binding operation. As a result, for example, the user is able to reuse the guiding device to bind the growing plant 1 when the plant grows up without cutting off the original guiding device. Thus, the guiding member 10 does not damage the outer skin of the growing plant 1 even the diameter size thereof increases, as shown in Fig. 5A.

It is worth to mention that the guiding device of the present invention is adapted to bind the stem of the growing plant 1 with the supporter 2 to guide the stem of the growing plant 1, as shown in Fig. 5B.

Fig. 6 illustrates a first alternative mode of the loop locker 30A which embodies as the locker slot 31A formed as a rectangular shape having an even width, wherein the locker slot 31A has a longitudinal length L substantially larger than a width W_T of the guiding member 10 and a transverse width L which is larger than a thickness of the guiding member 10 and is larger than a width W_1 of the holding neck portion 22 of each of the locking teeth 21. Accordingly, the longitudinal length L of the locker slot 31A is defined at a longitudinal edge thereof and the transverse width L of the locker slot 31A is defined at a transverse edge thereof.

Fig. 7 illustrates another alternative mode of the locking holder 20B. Accordingly, each of the locking teeth 21B is formed by an elongated slit 210B inclinedly cut on the tail portion 12 of the guiding member 10 from the longitudinal edge thereof wherein each of the locking teeth 21B has a guiding edge 211B having an outer end 2111B formed at the longitudinal edge of the tail portion 12 of the guiding member 10 and an inner end 2112B inclinedly and inwardly extended on the guiding member 10 towards the tail end thereof to define a holding neck portion 22B on the guiding member 10 at the inner end 2112B of the guiding edge 211B of each of the locking teeth 21B. The holding neck portion 22B of each of the locking teeth 21B has a width W_1 smaller than a width W_T of the guiding member 10.

It is worth to mention that the elongated slits 210B can be evenly formed at two longitudinal edges of the tail portion 12 of the guiding member 10 such that the locking teeth 21B are respectively formed along the two longitudinal edges of the tail portion 12 of the guiding member 10, as shown in Fig. 7.

Fig. 8 illustrates an alternative mode of the locking holders 20C which are respectively embodied as a plurality of locking teeth 21C integrally and alignedly formed along the longitudinal edge of the tail portion 12 of the guiding member 10, wherein the locking teeth 21C, having even thickness, are parallelly extending to the longitudinal edge of the tail portion 12 of the guiding member 10 to form as a comb shape so as to define a holding neck portion 22C on the guiding member 10 at a root portion of each of the locking teeth 21C, wherein the holding neck portion 22C of each of the locking teeth 21C has a width W_1 smaller than a width W_T of the guiding member 10.

Therefore, while the tail portion 12 of the guiding member 10 is twisted back to overlap on the head portion 11 thereof, the holding neck portion 22C of the corresponding locking tooth 21C is locked up at the locker slot 31C by the transverse width W thereof, so as to form the binding loop 101 of the guiding member 10. In addition, locking teeth 21C are integrally and alignedly formed along the two longitudinal edges of the tail portion 12 of the guiding member 10, as shown in Fig. 6, to enhance the locking ability of the locking holders 20C.

As shown in Fig. 8, the locker slot 31C has a longitudinal engaging portion 311C having a width larger than the thickness of the guiding member 10 and a longitudinal locking portion 312C integrally extended from the engaging portion 311C towards the head end of the guiding member 10, wherein the locking portion 312C has a width gradually increasing from the engaging portion 312C in such a manner that when the respective locking tooth 21C is locked at the locker slot 31C after the tail portion 12 of the guiding member 10 is slid through the locker slot 31C, the holding neck portion 22C of the respective locking tooth 21C is retained at the locking portion 312C of the locker slot 31C.

It is worth to mention that the engaging portion 311C of the locker slot 31C ensures the alignment of the tail portion 12 of the guiding member 10 with the longitudinal length L of the locker slot 31C while the locking portion 312C of the locker slot 31C restricts the twisting movement of the tail portion 12 of the guiding member 10 within the locker slot 31C to complete the locking operation of the loop locker 30C to one of the locking holders 20C.

It is worth to mention that the alternative modes of the locker holders 20, 20B, 20C and the loop locker 30, 30A, 30C, as shown in Figs. 1 through 8, can be

interchanged to detachably engage the loop locker 30, 30A, 30C with one of the locker holders 20, 20B, 20C by the corresponding dimensions. That is, the locker slot 31 has a longitudinal length L substantially larger than a width W_T of the guiding member 10 and a transverse width L which is larger than a thickness of the guiding member 10 and is larger than the width W_1 of the holding neck portion 22 of each of the locking teeth 21.

One skilled in the art will understand that the embodiment of the present invention as shown in the drawings and described above is exemplary only and not intended to be limiting.

It will thus be seen that the objects of the present invention have been fully and effectively accomplished. It embodiments have been shown and described for the purposes of illustrating the functional and structural principles of the present invention and is subject to change without departure from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.